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# **Application of LBE Method in Fiber-in-Liquid Flows for Downhole Pumpable Fiber Optic DTS Technology**

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Fiber Optic DTS (Distributed Temperature Sensing) technology has been increasingly used in monitoring oilwell temperature profiles. Its data provide critical information in oilwell operation control that significantly enhances the production rate. The pumpable fiber optic DTS has been a technical breakthrough in implementing the optic fiber along an oilwell. It uses the drag force between the optic fiber and the carrying fluid pumped into the steel tubing to install the fiber inside the tubing assembled along the oilwell. Although the fiber pumping technology has been invented for many years, the fundamental mechanism of the pumping process is not yet well understood. In this paper, the Lattice Boltzmann Equation (LBE) is used to simulate the three-dimensional viscous flow in a wavy pipe, as a first step in developing a general methodology to probe the three-dimensional flows in a curved pipe of nonuniform curvature. A Sphere-Chain model for flexible fiber is used to model the interaction between the fiber and the fluid. The Large-Eddy Simulation (LES) approach is used to treat high flow Reynolds numbers ( $Re$ ). Preliminary results show that the lattice Boltzmann approach is an effective method in simulating the fiber-in-liquid flow for the pumpable fiber optic technology.